**Individual Project due 24:00 7 October, 2012 (to be loaded onto your wiki).**

**Name:**

Project - Thin client network for a small business + remote energy audit

e.g. (only) <http://www.smartnow.com.au/>



The project could concentrate on installing a thin client network for a small business with solar panels, gel batteries, inverter and a small network of 20 desktop PC’s which may include a server, printer and other necessary equipment. The proposed network provides service to an office that has fluorescent lighting. Classes operate between the hours 8.30am to 3.30pm (7.00 hours)

Assumptions:

• The existing computer network is ON 5.5 days per week 24 hours per day

• The existing lighting is ON 5.5 days per week 10 hours per day

**Individual Project**

1. Negotiate with the stakeholders to establish the extent to which sustainability is to be integrated

Answer:

There are varying levels in which sustainable technology may be implemented into this project, these include both hardware and software solutions. I believe it would be beneficial to implement EPEAT Gold certified equipment that have an energy star rating. These devices will be thin-client and would then replace the current desktop models. The replacement Thin clients will run off POE, this will require the switch to be upgraded to a cisco Catalyst 2960 series. In addition to this, software will need to be installed on the current server to ensure it is compatible with the requirements of the upgrade and also to convert it into a Terminal Server. Using power management and power monitoring devices will allow you to reduce your overall power consumption and expenditure immediately.

**Hardware**

□ low powered hardware - the hardware I will be using is HP T410 All in one.

<http://h10010.www1.hp.com/wwpc/us/en/sm/WF06a/12454-12454-321959-338927-5231345-5234230.html?dnr=1>

□ energy efficient architecture I will also be using a Cisco 2960 series switch with POE

<http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps6406/product_bulletin_cisco_catalyst_2960_series_switches_with_power_over_ethernet_poe.html>

Summary: My Individual Project uses ….

**Software**

□ energy management software the power management device I will be using is Verismic Power Manager to reduce the power consumption

<http://www.verismic.com/pc_power_management.html> alongside a EnviR power monitoring tool to confirm power readings and catalogue power consumption.

**Printing**

□ local for this solution I will be using a Xerox ColorCube printing efficient device.

<http://www.office.xerox.com/printers/color-printers/colorqube-8570/enus.html>

□ online for the more complex printing requirements that cannot be completed on site I will be recomending to use a 3rd party offsite printing company. The recommended company is Vista print.

[Www.vistaprint.com.au](http://Www.vistaprint.com.au/)

2. Advise short term technology solutions to achieve reduction of power consumption

Answer:

A quick solution to reducing power consumption would involve simple measures of reducing the amount of power that is used when not required, i.e minimising power wastage. This could involve minimising the current “on” state of the equipment in the class rooms. As the class only runs from 830am to 330pm and the equipment is not in use when class concludes, there is an opportunity to power the equipment off until 830 the next morning. In a 5.5 day week, that is a saving of 93.5 hours of power. The same method can be used for lighting, as the lighting is on for 10 hours a day yet the class is only in use for 7 hours a day, turning the lighting off at the end of class and back on when class starts will reduce usage by 3 hours a day, which equates to 16.5 hours per week. A cumulative saving of 110 hours a week in energy consumption is possible if these short term solutions were to be implemented.

Although class room devices are able to be powered off the server and infrastructure devices will need to be powered on for house keeping services such as backups and updates to complete during the off periods. To resolve this problem, it is also possible to schedule updates and backups during the day and have the server power off in the afternoon after class has finished and power back up in the morning prior to class starting. This can be done for the infrastructure as well.

3. Identify energy usage within the scope of the ICT project and provide a detailed report

As shown below, we have completed an energy audit of the site under its current normal operating environment. The table below clearly states that thin clients use a lot less power than a standard computer. The thin client below at all times uses a lot less energy then that of the PC in an OFF state. With this in mind, when creating a solution for a class of this size, it is imperative that a clear scope of the tasks and processes from the class is provided before a recommendation is made. To backup these figures, we are installing an application by Verismic called Power Management tool. This application will monitor the devices and shut down the system when it detects that it is no longer in use. The software places the computer into a sleep or Off state and will awaken when used again. To verify the results a program called EnviR energy monitor is used and will double check the data and confirm the cost saving and energy saving.

|  |  |  |
| --- | --- | --- |
| **Condition** | **Power consumption**  **(watts)** | **Notes** |
|  | **PC** | ThinClient |
| **OFF** | 17 | 0.3 |
| **MAX BOOT** | 51 | 3.5 |
| **IDLE** | 42 | 3.2 |
| **Wordprocessing** | 36 | 3.3 |
| **Spreadsheets** | 36 | 3.3 |
| **Web browsing**  <http://news.bbc.co.uk/2/hi/programmes/click_online/default.stm> | 45 | 3.3 |
| **Low level music**  [http://grooveshark.com/#/s/Fall+At+Your+Feet/3KIZB0?src=5](#/s/Fall+At+Your+Feet/3KIZB0?src=5) | 44 | 3.3 |
| **Low level video**  [http://www.joost.com/39w1yk49/#/?video\_info=33p1yw1t](#/?video_info=33p1yw1t) | 57 | 3.3 |
|  |  |  |

**Individual Report**

**For your individual project answer the following:**

1. Explain how sustainability can be integrated into your individual Project
   1. Integrating sustainability into this project can be achieved by evaluating usage and required operating times. By also applying power consumption reduction techniques and software such as the Verismic power management tool we can monitor, reduce and identify future potential to reduce the consumption of energy in this classroom. To back up the Verismic power management tool we also implement an EnviR power monitor tool on the whole classroom ensuring our results are verified. After the initial investigation, we can then apply best practices and reduce the power consumption. We will also be integrating EPEAT gold equipment and energy star accredited equipment to increase our sustainability.
2. Research and identify suitable technology solutions applicable to the project Some technology solutions that I have researched are as follows:
   * 1. EnviR power monitoring tool – This tool allows the client to get a real time reading on the power consumption of the site. The added feature of integrating into a google application, allows the device to upload its real time data. The client can then perform reporting on the power consumption and graphthe consumption over time to identify peak periods and other ways to reduce the power consumption during those peak periods.
     2. Verismic Power Management Tool – This tool is software based and installs on the clients computer or thin client. This tool allows a higher level of customisation in terms of power management. This tool allows the client to power off functions and settings such as graphics acceleration and screen savers as these are not needed in day to day computer operation. Also placing the computer into a sleep state when left idle for a selected amount of time. Verismic claim a ROI in 6 or less months.
     3. HP All in one thin-client – This device provided by HP incorporates all required technology into a singular device. It has a monitor, processing core with network and usb interfaces. All this is designed and manufactured to run off a singular CAT5/6 Cable, powered via POE from the switch. This is a massive saving in Research and development as HP have done all the leg work and created a very energy efficient solution that uses a total of 24 watts peak. In comparison a standard desktop computer will use 17watts in a powered off state and a total of 42watts in an idle state. HP have designed this product to be as environmentally friendly as possible and in doing so have gained EPEAT gold certification and ENERGY star status.
     4. Xerox Green Printer – this printer has been designed out of the box to save power and reduce paper consumption and waste generation. By using solid ink technology it reduces waste by 90% and reduces energy demand over its life cycle by 30%. It also has a 30% smaller carbon foot print compared to laser printers. The Color Qube Printer is also energy star certified and with Earthsmart print driver settings uses double sided paper to reduce the waste of paper usage. The printer also reduces 40% power consumption due to Phaser 8560 technology.
3. Explain the power consumption data compared to benchmarks
   1. The estimated power consumption of using thin clients with the verismic power management tool and the EnviR monitoring tool is significantly lower than that of the current benchmark, as seen in the table below. The comparison benchmark is the current systems in use, comparing those figures to that of the proposed solution shows that the key areas where benefits will be seen are the offline times as the power management tool will power the devices into an off state when they are not used, this will save a lot of power, and as the system is self managed it means that it can be left to operate on its own.
4. Advise how sustainable management principles may be applied to your individual project resulting in reduced environmental impact:
   1. Purchasing equipment that is EPEAT certified immediately reduces the impact on the environment without sacrificing the ability to maintain efficiency. When using power management best practices within the classroom and energy star certified products, power consumption and power requirements significantly drop and the carbon foot print will be significantly reduced. Implementing these principles will also raise awareness of sustainable management practices to all stakeholders within the company and may lead to energy reductions at home and other businesses.
5. Provide key performance indicators (KPI) - sustainability performance for your individual Project

**Key Performance Indicators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware** | **SD-KPI 1: Energy / greenhouse gas efficiency of production / products in use**  **(tons CO2)** | **SD-KPI 2: Proportion of products with “Design for Environment” / Eco-Label**  **()**  **or (x)** | **SD-KPI 3: Emissions of (hazardous) waste and toxic materials**  **Yes or No** |
| Server | 0.045x24x5x52x6.8956/10000=0.1936 | No | ROHS No |
| Thin-clients | Total for each 0.009x8x262x6.8956/10000=0.0130  Total Per 20 = 0.25816 | EPEAT Gold Compliant and also Energy star rating compliant. | ROHS YES |
| Switch | .008x24x365x6.8956/10000=0.0489 | POE for thin clients, power consumption automation and ability to set how much power the switch uses. | ROHS Yes |
| Printer | 0.016x24x365x6.8956/10000=0.096648 | Energy Star efficient, using solid ink used to reduce waste by up to 90%, two sided printing. | ROHS No |
| Router | 0.007x24x365x6.8956/10000=0.042283 |  | ROHS No |

1. Advise what actions could improve the KPI’s for your Individual Project which foster sustainability and environmental best practice
   1. quarterly annalysis of power usage and evaluation
   2. increase of use of renewable resources such as solar power and wind power.
   3. Reduce operational times of the classroom by offering an online option such as wiki or a forum for work – allowing the students to utilise their own equipment and reduce the requirements and need for the use of class resources.

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware** | **Benchmark**  **(tons CO2)** | **Individual Project**  **(tons CO2)** | **Individual Project**  **+**  **Recommended Actions**  **(tons CO2)** |
| Server | 0.271824552 | 0.0564749 | Device is to be powered off after 4.30 ( to allow updates and backups) and powered back on at 8.00 am. |
| Router | 0.0483 | 0.0123327 | Device is powered off at 4.30 and back on at 8.00 am |
| Printer | 0.0966 | 0.0281892 | Device is powered off at 3.30pm and back on at 8.30 am. |
| Thin Client | 0.25816 | 0.2276375 | Devices are powered on at 8.30 am and powered off at 3.30pm |
| Switch | 0.0489 | 0.0140946 | Device is powered off at 4.30 and back on at 8.00 am |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Recommendation** | **Priority** | **Implementation Cost** | **Energy Saving** | **Payback Period** |
| Power saving best practices | 1 | $0 | 93.5 Hours per week | Immediate. |
| Implement power saving technologies and monitors (Verismic and EnviR) | 2 | $500-$1000 depending on implementation | 20% power usage reduction | 3 to 6 months |
| Upgrade software on server with terminal server compliant software | 3 | Free – Using Ubuntu or $500+ licences for MS | 0% directly | None. |
| Upgrade Switch to Catalyst 2960 series with POE | 4 | $2000 | 0% directly | None. |
| Replace workstations with Thin Clients from HP that use POE as source of power and are a built in unit. | 5 | $499 each x 20 = $9980 | 92% energy saving per device | 3 years |